

PROC. R. SOC. VICT. vol. 94, no. 2, 53-60, June 1982
SEALS IN TASMANIAN PREHISTORY

By JIM STOCKTON

Department of Prehistory, Research School of Pacific Studies, Australian National University, P.O.
Box 4, Canberra, ACT 2600

ABSTRACT: Aboriginal sealing began over 8000 years ago and continued up to the early part of the last century. Species exploited included *Arctocephalus pusillus doriferus*, *A. forsteri*, *Mirounga leonina* and *Hydrurga leptonyx*. Historical information, derived from Warneke (1976), on the locations of seal colonies at the time of the arrival of European explorers is plotted as a series of maps. Archaeological data on the antiquity and distribution of seal remains are presented. Aboriginal methods of sealing are reviewed, and their possible effects on the prey species considered. It is concluded that there are insufficient data available at present to suggest a change in seal numbers through time, in spite of the long duration of the predator/prey relationship.

In prehistoric midden sites in coastal north-western Tasmania the numerous remains of seals attest to the importance of seals as a meat source to the Aborigines. In this paper I have attempted to synthesize all the available ethnographic information on Aboriginal sealing, and to look at the antiquity of seal remains in Tasmania.

The data for this paper fall into three broad classes, biological, historical, and archaeological.

SYNOPSIS OF RELEVANT BIOLOGICAL DATA

Biological data relevant to the prehistoric use of seals was taken from a variety of published and unpublished sources (Gaskin 1972, Horton 1978, Hyett & Shaw 1980, Thoughton 1965, Warneke 1975, 1976 and pers. comm., Wood Jones 1925). In the period when the colonists first entered Tasmanian waters, there appear to have been four common species of seal around Tasmania and in Bass Strait, consisting of Southern Elephant Seal, Australian Sea Lion, Australian Fur Seal, and New Zealand Fur Seal. The Leopard Seal is and was an occasional visitor, but was never abundant. Although Wood Jones (1925) referred to Australian Sea Lion remains having been found in Aboriginal middens in Tasmania, subsequently they have not in fact been identified in excavations and will not be dealt with in this section. It is quite possible that Australian Sea Lion remains will be found in future excavations.

SOUTHERN ELEPHANT SEAL, *Mirounga leonina*

At the start of the Nineteenth Century, large colonies of the Southern Elephant Seal occurred on the Hunter Islands, New Year Island, and on King Island (Micco 1971) (Fig. 1), but today the nearest breeding grounds are on Macquarie Island (Green 1973). Reproductive behaviour of this species has been summarised by Warneke (1976). Breeding sites are usually sandy beaches. Mature males are ashore from early August to early December while mature and pregnant cows start arriving in September. Groups of females form harems with large male 'beachmasters'. On average

a female is on the breeding site for 28 days during which she does not eat. Lactation lasts about 23 days (Hyett & Shaw 1980). During this time pups gain about 5 kg in weight per day (Warneke 1976). The male Southern Elephant Seal is the largest seal occurring in Tasmanian waters. At maturity it may attain lengths of 6 m and weights of 3 600 kg. Females weigh about 900 kg at maturity and attain lengths of 3-4 m.

The Southern Elephant Seal also spends a period ashore during December, January and February when adults of both sexes haul out on suitable beaches to moult. This process take about 20 to 40 days, during which time the animals cease feeding and rarely go near the sea unless disturbed. When the moult is complete the animals return to the sea to feed, and large concentrations of Elephant Seals are not seen ashore until the following breeding season. However breeding sites may not be completely abandoned as there are usually some resting young present all year round (Hyett & Shaw 1980).

AUSTRALIAN FUR SEAL, *Arctocephalus pusillus doriferus* AND NEW ZEALAND FUR SEAL, *Arctocephalus forsteri*

As the *Arctocephalus* remains in middens cannot usually be identified to species, the life history of both species will be considered together.

Fur seals were recorded in early accounts at numerous locations throughout Bass Strait. The highest concentrations were around King Island and the Furneaux Group (Fig. 2). The Australian Fur Seal is the only seal which is still a regular breeding species in Bass Strait (Green 1973). The distribution map of modern seals is based on Pearse (1979) (Fig. 3). The figure is somewhat misleading as the number of sites cannot be directly equated with abundance; some of the locations had very few individuals. Although there is little detail of the historic colonies of seals in the southeast and south, they were present.

Australian Fur Seal males grow to about 2.25 m long with weights of up to 360 kg, while females grow to around 1.5 m and 90 kg (Hyett & Shaw 1980). New



Fig. 1 – Historic locations of *Mirounga leonina* colonies (source: Warneke 1976). Scale and north marker as for Figure 2.

Zealand Fur Seal males grow up to 2 m and 110 kg, while females are up to 1.6 m and 80 kg (Hyett & Shaw 1980). Breeding locations, usually exposed rocky beaches, are occupied by males from October. Most females give birth in November (Australian Fur Seal) and January (New Zealand Fur Seal). Pups weigh around 4–5 kg. Australian Fur Seal pups congregate in groups of up to 50 while their mothers are away feeding.

Observations on the vulnerability to capture of Australian Fur Seal have been made (R. M. Warneke pers. comm.). Young pups less than eight weeks of age are almost helpless on land. If harassed they quickly take refuge in the sea, but soon tire and return to shore. If the hunter lay down and remained still the pups would approach quite closely. By three months of age they are strong active swimmers and are much more difficult to catch by pursuit; they are quite curious however, and will approach a stationary crouching person. Around 20% of pups die of natural causes in the first three months (Horton 1978).

The reconstructions of the distribution of Southern Elephant Seal and of fur seals (Figs 1, 2) are based on historic records (Warneke 1976). In spite of the limitations of the historical records, the maps show the highest density for both groups is on the inaccessible islands of Bass Strait.

LEOPARD SEAL, *Hydrurga leptonyx*

The Leopard Seal ranges widely through the Southern Ocean but is a rare visitor to Tasmania. The species is migratory, with both immature and adult seals moving northwards in the autumn and winter. The younger animals tend to wander further afield than reproductively mature adults. Fully grown a female may weigh 450 kg and attain a length of 4 m. Males weigh about 270 kg and attain lengths of about 3 m at maturity. On land Leopard Seals are quite agile (Gaskin 1972).

HISTORIC ACCOUNTS OF ABORIGINAL SEALING

Information on the hunting and use of seals is contained in the journals of Robinson (Plomley 1966) and Kelly (1920). There are two types of Aboriginal weapon for hunting seals described in the literature, a club and a spear. In his account of a voyage around Tasmania in 1815–1816, Kelly (1920) describes Aboriginal women stalking seals at George Rocks. This fascinating account describes Aboriginal women sneaking up on seals by imitating seal behaviour. After first washing their bodies to lessen the chance of the seal catching their scent, they approached slowly from the downwind side to the rocks where the seals lay sleeping. When observed by a seal the women would imitate the seals' movements by raising their heads, looking around, and scratching. The six women stayed on the rocks with the seals (where they were washed by the occasional wave) for nearly an hour before making their attack. Each then clubbed two seals. By clubbing a seal on the nose it can be stunned into unconsciousness, and then dispatched. Over the next few days the women continued to catch seals from the rocks, even though the animals were becoming increasingly shy. When Kelly's party and Aboriginal helpers returned to the mainland, the men danced around a pile of seal carcasses on the beach, sticking their spears into the dead seals as if killing them (Kelly 1920). There is an interesting problem in this northeast region in that the people did not have watercraft (Jones 1976). All the seal colonies on the islands of the Furneaux Group and George Rocks were inaccessible to them until the arrival of the colonists and their boats. Some of these islands are as little as 3 km offshore.

The reference to killing seals by spearing is contained in a hearsay account in Robinson's journal where Robinson's native companion WOORADY describes sealing at Cox Bight by the Bruny Island and southwest



Fig. 2—Historic locations of *Arctocephalus* spp. colonies (source: Warneke 1976)

tribes who “went off in catamarans to the De Witt Islands and to the different rocks, and speared seal and brought them back to the mainland. Also went to the Eddystone and speared seal.” (Plomley 1966). On one occasion Robinson observed a large seal at Cox Bight which the natives killed, but he does not say how it was dispatched (Plomley 1966). However, he does say that it was cut into fitches which were then carried to the camp. If butchering at the kill site was a common prac-

tice for large seals, then their bone remains will be under represented in middens, having been left behind at the site of the kill. Vanderwal (1978) has excavated seal remains in a midden on Maatsuyker Island and interprets the bulk of archaeological debris to suggest local consumption rather than a return to the mainland with the meat, but the reasons for this statement are not given. The seal bones recovered by Jones (1966) at West Point are all from young animals and bones from the flippers



Fig. 3—Modern observations of fur seals (source: Pearse 1979)

and skull over represented (R. Jones pers. comm.).

Also of interest is Robinson's mention of Aborigines catching a Leopard Seal at Sandy Cape (Plomley 1966) and an unsuccessful attempt to catch a seal at Hunter Island (Plomley 1966). The Hunter Island seal he calls a "Leopard Oil Seal from its being spotted like a leopard", which Plomley (1966) interprets as a Leopard Seal.

Seal meat was a food which the Tasmanians were very fond of (Plomley 1966) but hunting seals was a high risk activity. Robinson records in his diary that WOORADY had told him that many hundred natives had been lost on sealing trips to the De Witt group and Eddystone Rock (Plomley 1966). Although this is probably exaggerated, access to these islands does involve water crossings of 5 km and 27 km respectively. Further confounding this claim, a voyage of 27 km should have been beyond the capacity of Tasmanian watercraft (Jones 1976). Steep Island and Albatross Island in the northwest involve water crossings of 3.2 km and 11.3 km, and neither appear to have been visited by Aborigines in the recent prehistoric period (Bowdler 1974, R. Jones pers. comm.). The reference to Eddystone Rock may be a mistake in Robinson's translation of the location. On another occasion TRUCANINI told Robinson that the seals fought with the men at Cox Bight, and that once "a seal caught a black man by the thigh and they both fell over the rocks into the water and the seal carried the man down. He however came up but was ever after lame" (Plomley 1966). WOORADY relates at least four attacks by seals in the Cox Bight area (Plomley 1966). The risks of seal hunting fall into three categories. Seals occasionally attacked the hunters.

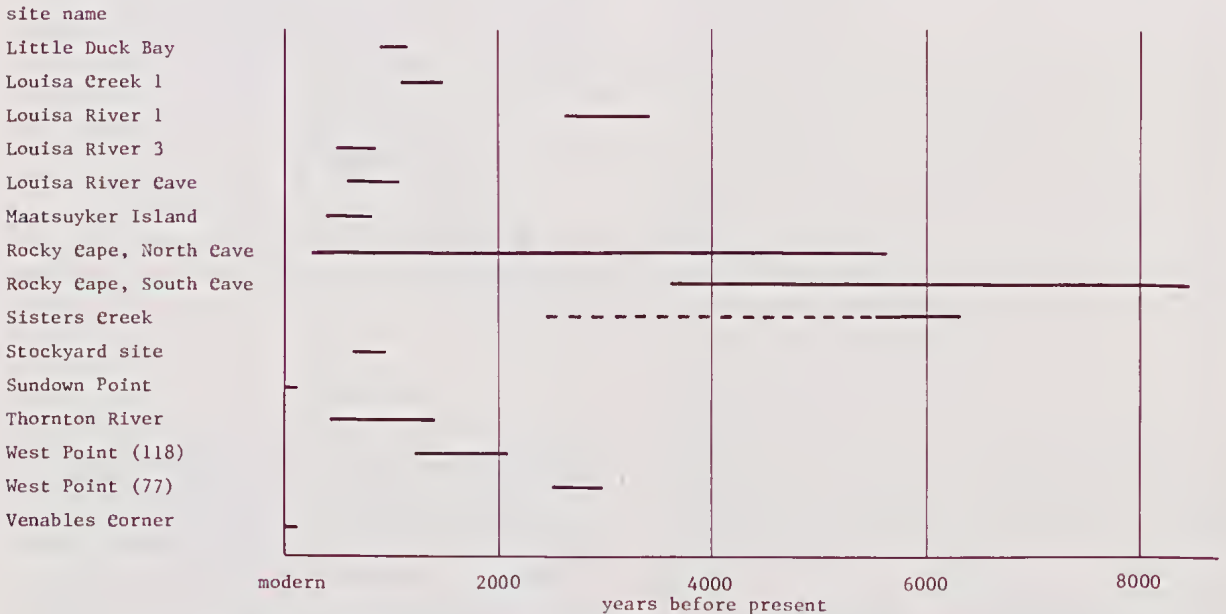


Fig. 4—Dates of seal remains in Tasmanian archaeological sites. The dotted line for Sisters Creek is based on stratigraphic correlation with Rocky Cape.

Long distance water crossings were dangerous given the inherent structural limitations of Tasmanian watercraft (Jones 1976). There was a risk of injury while landing on wave swept rocky seal islands.

ARCHAEOLOGY OF SEAL REMAINS

How long have seals formed part of the diet of the coastal people of Tasmania? I have plotted the C14 dates \pm two standard deviations for all the sites where seal remains occur throughout the deposit (Fig. 4). The Rocky Cape sequence demonstrates some 8 000 years of continuous exploitation of seal. It was about this time that the rising post-glacial sea level reached the vicinity of the Cape and shows that seals (and seal hunters) came with the encroaching sea. The next dated appearance of seal bone is at Sisters Creek at around 6 000 BP. No top date is available for the Sisters Creek site, but on stratigraphic correlation with Rocky Cape its upper layers (which do not contain fish bones) are taken to be less than 3 500 years old (R. Jones pers. comm.). The remaining dates show the occurrence of seal remains from around 3 000 BP to the present for west and southwest sites. The figure shows a pattern of long-term exploitation of seals in coastal sites up to the contact period, but the pattern is not quite that simple. In the northwest, seal bones were not recorded in the excavations of the midden layers of Cave Bay Cave on Hunter Island (Bowdler 1979). Similarly in the east and southeast at Little Swanport (Lourandos 1970), Alum Cliffs



Fig. 6—distribution of *Arctocephalus* spp. remains

(Stockton 1978), Shag Bay (Vanderwal 1977), and Jordan River (Healey & Stockton 1980, Gaffney & Stockton 1980) seal bones were not found. That so many sites do not contain seal bones cannot be dismissed as a problem of excavation sample size. This is especially true of the large excavations of the midden layers in Cave Bay Cave, which is geographically close to the northwest and covers a similar time span to sites which contain seal bones. Why do seals appear to be abundant in some locations, but absent from others?

DISCUSSION

The distribution of archaeological seal remains was compiled from published and unpublished sources. The majority of the observations are of fragmentary remains noted during field reconnaissance. Under these conditions it is easy to distinguish seal bone from other mammals, but difficult to identify species. A number of people contributed records of their observations of seal remains in middens in response to a letter circulated in 1980. Subsequently, it was possible to check many of the observations from northwest Tasmania, but records from other areas were not checked. Identifications to generic level for *Arctocephalus* spp. and specific level for other seals were available for remains from excavated sites (Jones 1966, 1971, Bowdler 1979, Vanderwal 1978). The distribution of archaeological sites with prehistoric seal remains shows a marked concentration on the northwest coast (Figs 5-8), from Sandy Cape to Cape Grim, with a lower frequency along the remaining



Fig. 5—Distribution of seal remains of all species

coast. Of lowest frequency are the Bass Strait coast east of Port Sorell, and Tasman Peninsula and Bruny Island. The patterns for *Arctocephalus* spp. (Fig. 6) and *Mirounga* (Fig. 7) remains are similar. The remains are found on the northwest, west and southwest coast. These patterns reflect the locations of analysed excavations where accurate generic identifications are available, and so the absence of records from other areas may bias the picture. This could be tested by sampling sites in other areas for seal remains. This could be done quite easily by collecting material from deflated sites around the coast. Occurrence of the Leopard Seal (Fig. 8) is less common than the other species. The species was recorded ethnographically, and an Aboriginal word, "TOPER", has been recorded for it (Plomley 1976). The present day distribution of fur seal is in contrast to the archaeological and contact period distributions. The modern pattern is strongly centered on the south and southeast coast. Several hypotheses can be advanced in an attempt to explain this.

Did Aborigines exterminate or drive away the seals of the coastal breeding populations before European arrival, as Jones (1966) speculated for the Southern Elephant Seal at West Point. There is no evidence that seals breed on "mainland" coasts, so it is extremely unlikely that *Mirounga* was breeding on the Tasmanian coast at any time. Secondly modern C14 dates have been obtained for sites containing Southern Elephant Seal at Sundown Point (Ranson pers. comm.) and at Venables Corner. Both of these sites also contain fur seal.



Fig. 7—Distribution of *Mirounga leonina* remains



Fig. 8—Distribution of *Hydrurga leptonyx* remains

Did Aboriginal activity reach just the fringe of the range of seals? Were the main seal areas on inaccessible islands in Bass Strait or the far south? Was it just the stray wandering seal which came ashore on the mainland and fell prey to the Aborigines? Because of the extremely high density of seal remains along the northwest coast, I have plotted the distribution for the region at a larger scale (Fig. 9). The high density of site information here is partly due to the fact that the coast from Cape Grim to Macquarie Harbour has been surveyed more frequently and more intensively than any other part of Tasmania. Also, shell middens in the northwest are more numerous and larger than elsewhere in Tasmania. Consequently, in this well studied area we find an almost continuous occurrence of seal remains. This suggests a resident population of seals, or regular visitors, all along the coast. At West Point, Jones' (1966) tentative minimum numbers estimates for seals in the whole site is several thousand individuals. Supplementing this, analysis of the Southern Elephant Seal canine teeth has shown that all specimens were young animals, with some teeth belonging to seals less than three months old. All this evidence suggests a large breeding colony of Southern Elephant Seals in the immediate vicinity—but where was it located? There are no offshore islands or rocks any distance from the coast, but there are a few little islands less than 100 m away. Some of these have shell midden on their surface, and in 1980 two were rookeries for the Little Penguin, *Eudyptes*

tula minor. The simplest explanation of the evidence is to put breeding Southern Elephant Seal colonies on the shore of the Tasmanian mainland, or on these islands just off shore, where they are quite accessible to Aborigines. In fact, given the age structure of the seals found at West Point, is it possible the Aborigines are just scavenging dead juveniles? (Horton 1978). On the other hand, there is historical evidence for a concentration of *Mirounga* to the northwest of Tasmania on King Island, New Year Islands and Hunter Island (Peron in Micco 1971). The prevailing winds are southwesterly i.e. onshore. With significant seal activity in the offshore waters it is inevitable that some freshly dead, sick or tired individuals are going to end up on the coast. The presence of the remains of juveniles of less than three months of age at West Point is not surprising as the pups are weaned at about one month (Warneke 1975). This evidence does not imply that there was a breeding colony at West Point. The same argument also applies to *Arctocephalus*. During a seven year period Warneke recovered 170 tagged pups within a radius of 140 km

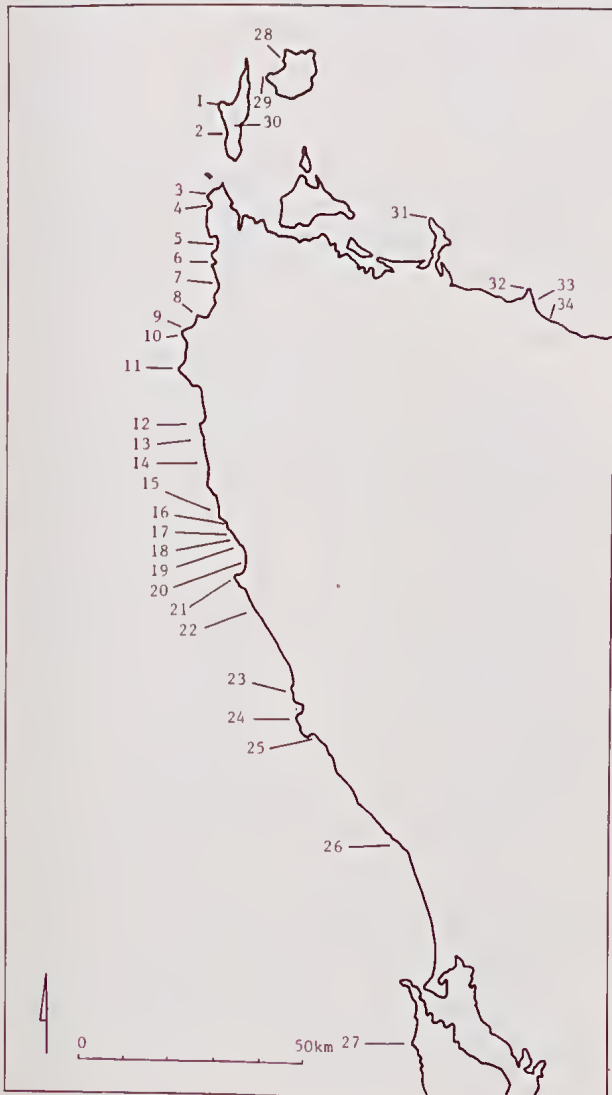
from the Seal Rocks colony of *A. pusillus doriferus*. This is just 2% of the total sample tagged in the same period. The sealer Kelly estimated that the Albatross Island colony off Hunter Island had a population in the order of 12 000 (Plonley 1966). Reid Rocks further to the northwest probably had more than 2 000 animals and the many colonies around King Island possibly exceeded 50 000 (R. M. Warneke pers. comm.). With these population numbers, beach scavenging could account for all the fur seal remains in northwest Tasmanian coastal middens (R. M. Warneke pers. comm.). No reference to historic sealing on the northwest coast of Tasmania has been found (Warneke 1976).

CONCLUSIONS

Quantitative studies of seal remains in large sites may give clues to the times of the year when seals were killed. With an idea of what ages and sexes were killed it should be possible to describe the population structure of the seal groups that the Aborigines preferred to prey upon. Alternatively, it may suggest that the Aborigines were collecting dead animals. Work along these lines using growth rings on teeth is presently being conducted by Horton (1980) on material from Maatsuyker Island and O'Connor (1980) for West Point. Since the various species vary so widely in size and habits, any reconstruction concerned with seasonal availability or significance of seals in the diet will need to be species specific.

The distribution maps for seal remains indicate few records of seal bone in the northeast and southeast. Whether this is a reflection of the true distribution or an artefact of a lack of archaeological work in the region could be tested by systematic site survey and sampling.

Fig. 9—Distribution of seal remains in northwest Tasmania. Location and observer of numbered sites:



1, Curvier Point—pers. obs. 2, Little Duck Bay—Bowdler (1979). 3, Suicide Bay—pers. obs. 4, Valley Bay—Jackson (pers. comm.), pers. obs. 5, Studland Bay—Lourandos (1970). 6, Calm Bay—Jackson (pers. comm.). 7, Maxies Point—Lourandos (1970), Jackson (pers. comm.). 8, Green Point—Lourandos (1970), Jackson (pers. comm.), pers. obs. 9, West Point (Nettley Bay)—Jones (1966), pers. obs. 10, West Point (south)—Jones (1966), Jackson (pers. comm.), pers. obs. 11, Bluff Hill Point—Jackson (pers. comm.), pers. obs. 12, Sundown Point—Ransom (pers. comm.), Jackson (pers. comm.), pers. obs. 13, Nelson Bay—pers. obs. 14, Rebecca—Jackson (pers. comm.). 15, Gannei Point Hazard Bay—Jackson (pers. comm.). 16, Ordinance Point—Pulleine (1929), Jackson (pers. comm.), pers. obs. 17, Thornton River—pers. obs. 18, Daisy River—pers. obs. 19, Wild Wave River—pers. obs. 20, Sandy Cape Beach—pers. obs. 21, Sandy Cape/Venables Corner—Pulleine (1929), Legge (1929), Jackson (pers. comm.), Ransom (pers. comm.), pers. obs. 22, Johnson River—Jackson (pers. comm.). 23, Rupert Point—Jackson (pers. comm.). 24, Conical Rocks—Jackson (pers. comm.). 25, Ahrberg Bay—Jackson (pers. comm.). 26, Trial Harbour—Cane (pers. comm.). 27, Sloop Rocks—Jackson (pers. comm.). 28, Ranger Point—pers. obs. 29, Burgess Point—pers. obs. 30, Homestead Lagoon (Stockyard site)—Bowdler (1979). 31, North Point—pers. obs. 32, Rocky Cape—Jones (1966), pers. obs. 33, Lec Archer—Jones (pers. comm.). 34, Sisters Creek—Jones (1966).

The large numbers of seals in the Furneaux Group and Maria Island at contact suggests that seal remains should be common in middens on the adjacent coasts.

The overall impression of the combined archaeological and ethnographic data is a picture of long term exploitation of seals by Aborigines. An early speculation by Jones (1966) that the Aborigines had in prehistoric times caused the local abandonment of the Tasmanian mainland coast by the Southern Elephant Seal has not been resolved. Jones proposed the idea of C14 dating the latest phase of prehistoric Aboriginal sealing to see if the species continued to be found up to the contact period. This has now been done by Bowdler, Ranson, Vanderwal and the author, who have shown that the species is present up to the contact period. However, we still do not know if the seals were living on the coast in colonies, or only coming ashore occasionally. The presence of juvenile *Mirounga* teeth (less than three months old) at West Point does not resolve the problem as weaning occurs at about one month of age, after which the juveniles will be travelling widely in order to feed. There is insufficient evidence to suggest a decline or increase in seal numbers, in spite of at least 8 000 years of continuing predator/prey relationship. This relationship was to alter drastically when the arrival of European technology made it possible to exploit previously inaccessible colonies in Bass Strait.

ACKNOWLEDGEMENTS

The distribution maps which forced me to think about the problems outlined here were compiled from contributions by Scott Cane, David Horton, W. D. and L. Jackson, Rhys Jones, Don Ranson, Ron Vanderwal and the Tasmanian Aboriginal Sites Index. I am deeply indebted to their willingness to share information. For comments on early drafts of this paper I am indebted to R. H. Green, John Luly, R. M. Warneke, Jeanette Hope, Rhys Jones and Phil Hughes. R. M. Warneke generously gave access to unpublished material, and discussed many of the difficult questions raised in this paper.

REFERENCES

- BOWDLER, S., 1974. An account of an archaeological reconnaissance of Hunter's Isles, north-west Tasmania, 1973/4. *Rec. Queen Vict. Mus.* 54: 1-22.
- BOWDLER, S., 1979. Hunter Hill, Hunter Island. Unpublished PhD thesis, Australian National University.
- GREEN, R. H., 1973. *The Mammals of Tasmania*. The Author, Launceston.
- GAFFNEY, L. & STOCKTON, J., 1980. Results of the Jordan River Midden Excavation. *Australian Archaeology* 10: 68-78.
- GASKIN, D. E., 1972. *Wales, Dolphins and Seals*. Heinemann.
- HEALEY, L. & STOCKTON, J., 1980. Problems and potentials of archaeological evidence for prehistoric biophysical description in the Derwent estuary. *The Artefact* 5: 145-154.
- HORTON, D. R., 1978. Preliminary notes on the analysis of Australian coastal middens. *Australian Institute of Aboriginal Studies Newsletter* 10: 30-33.
- HORTON, D. R., 1980. Age determination in Australian Fur Seals based on canine teeth. *Bull. Aust. Mammal Soc.* 6: 41.
- HYATT, J. & SHAW, N., 1980. *Australian Mammals*. Nelson, Australia.
- JONES, R., 1966. A speculative archaeological sequence for northwest Tasmania. *Rec. Queen Vict. Mus.* 25: 12.
- JONES, R., 1971. Rocky Cape and the problem of the Tasmanians. Unpublished PhD thesis, ANU.
- JONES, R., 1976. Tasmanian aquatic machines and off-shore islands. In *Problems in Economic and Social Archaeology*, G. de G. Sieveking, I. H. Longworth & K. E. Wilson, eds, Duckworth, London, 235-263.
- KELLY, J. 1920. First discovery of Port Davey and Macquarie Harbour, by James Kelly *Pap. Proc. R. Soc. Tasman.* 1920: 160-181.
- LEGGE, R. W., 1929. Tasmanian Aboriginal Middens of the West Coast. *Australasian Association for the Advancement of Science* 19: 323-328.
- MICCO, H. M., 1971. *King Island and the Sealing Trade, 1802*. Roebuck, Canberra.
- LOURANDOS, H., 1970. Coast and hinterland: the archaeological sites of eastern Tasmania. Unpublished MA thesis, ANU.
- O'CONNOR, S., 1980. Bringing it all back home: an analysis of the vertebrate faunal remains from the Stockyard Site, Hunter Island, north-west Tasmania. Unpublished B.A. Honours thesis, University of New England.
- PEARSE, R. J., 1979. Distribution and conservation of the Australian fur seal in Tasmania. *Vict. Naturalist* 96: 48-53.
- PLOMLEY, N. J. B. (ed.), 1966. *Friendly Mission. The Tasmanian Journals and Papers of George Augustus Robinson 1829-1834*. Tasmanian Historical Research Association, Hobart.
- PLOMLEY, N. J. B., 1976. *A Word-list of the Tasmanian Aboriginal Languages*. The author in association with the Government of Tasmania.
- PULLEINE, R., 1929. The Tasmanians and their stone culture. *Australasian Association for the Advancement of Science* 19: 296-314.
- STOCKTON, J., 1978. Archaeological investigation of the Derwent River Estuary, south-east Tasmania: Alum Cliff's test excavation interim report. *The Tasmanian Naturalist* 53: 8-9.
- THOUGHTON, E., 1965. *Furred Animals of Australia*. Angus and Robertson, Sydney.
- VANDERWAL, R. L., 1977. The Shag Bay Rockshelter, Tasmania. *The Artefact* 2: 161-170.
- VANDERWAL, R. L., 1978. Adaptive technology in south west Tasmania. *Australian Archaeology* 8: 107-127.
- WARNEKE, R. M., 1975. Dispersal and mortality of juvenile fur seals *Arctocephalus pusillus doriferus* in Bass Strait, Southeast Australia. *Rapp. P.-v. Reun. Cons int. Explor. Mer* 169: 296-302.
- WARNEKE, R. M., 1976. *Preliminary report on the distribution and abundance of seals in the Australian region*. Scientific Consultation on Marine Mammals, Food and Agriculture Organisation of the United Nations, Bergen, Norway.
- WOOD JONES, F., 1925. *Mammals of South Australia Part 3, The Monodelphia*. Government Printer, Adelaide.